


ser. 10/667,463

(19)  **Europäisches Patentamt**
European Patent Office
Office européen des brevets



(11) **EP 1 340 656 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
03.09.2003 Bulletin 2003/36

(51) Int Cl.7: **B60R 21/16**

(21) Application number: 03001367.6

(22) Date of filing: 24.01.2003

(84) Designated Contracting States:
AT-BE-BG CH-CY CZ-DE-DK EE-ES FI-FR GB-GR
HU-IE IT-LI LU-MC NL-PT SE-SI SK-TR
Designated Extension States:
AL-LT LV-MK-RO

- Takedomi, Akifumi
Minato-ku, Tokyo-106-8510 (JP)
- Tanaka, Tadashi
Minato-ku, Tokyo 106-8510 (JP)
- Kurimoto, Takeshi
Minato-ku, Tokyo 106-8510 (JP)

(30) Priority: 25.02.2002 JP 2002048175

(71) Applicant: **TAKATA CORPORATION**
Minato-ku, Tokyo 106-8510 (JP)

(74) Representative:
Banzer, Hans-Jörg, Dipl.-Ing. et al
Kraus & Weisert
Patent- und Rechtsanwälte
Thomas-Wimmer-Ring 15
80539 München (DE)

(72) Inventors:
• Kumagai, Masayoshi
Minato-ku, Tokyo 106-8510 (JP)

(54) **Airbag apparatus**

(57) The object is to provide an airbag apparatus capable of individually setting the pressure when the chambers divided in the airbag are inflated. When a gas generator (3) is operated, gas is emitted from gas jets (5) and flows into a first chamber (1a) and a second chamber (1b) through gas outlets (4a) and (4b) of a gas distributor (4), respectively; the chambers (1a) and (1b)

are inflated; and an airbag (1) is deployed along the window side of a seat (10). The first gas outlet (4a) is larger in diameter than the second gas outlet (4b), so that the gas is supplied to the first chamber (1a) in larger quantities and at higher pressure than to the second chamber (1b). Consequently, the first chamber (1a) is inflated at high internal pressure.

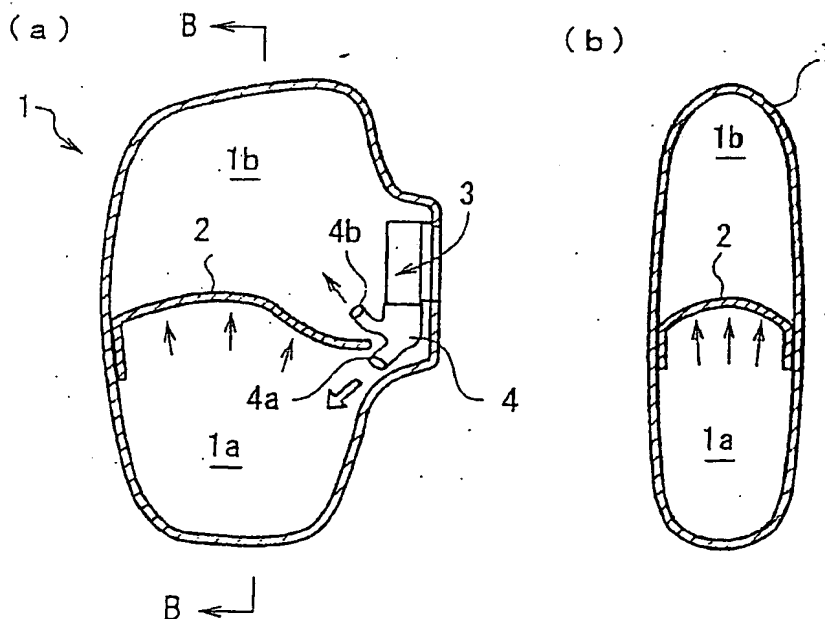


Fig. 2

EP 1 340 656 A2

Description

[Technical Field of the Invention]

[0001] The present invention relates to an airbag apparatus for protecting an occupant in a motor vehicle or the like, and more specifically, it relates to an airbag apparatus having an airbag the interior of which is divided into a plurality of chambers.

[Description of the Related Art]

[0002] As well known, airbag apparatus inflate an airbag with a gas generator and receive an occupant's body with this inflated airbag.

[0003] Known airbags have an arrangement in which, for early inflation of a portion of the airbag, to which an occupant abuts early, prior to the other portions, the interior of the airbag is divided into a plurality of chambers, gas is supplied from a gas generator to part of the chambers to inflate it early, and then the gas that has passed through the chamber is made to flow in the other chambers to inflate them.

[Problems to be Solved by the Invention]

[0004] Accordingly, the object of the present invention is to provide an airbag apparatus in which gas from a gas generator is directly supplied to each chamber of an airbag.

[Means for Solving the Problems]

[0005] According to the present invention, this object is achieved by an airbag device as defined in claim 1. The dependent claims define advantageous and preferred embodiments of the present invention.

[0006] In an airbag apparatus according to the present invention, an airbag apparatus comprises: an airbag the interior of which is divided into a plurality of chambers; and a gas generator for inflating the airbag and is characterized in that gas is guided directly to each chamber from a common gas generator.

[0007] In such an airbag apparatus, gas from the gas generator is directly supplied to each chamber without passing through the other chambers. Therefore, the amount and the pressure of gas to be guided to each chamber can individually be set so that the gas pressure of each chamber becomes target gas pressure by making each chamber into a discommunicating state and setting the size of the gas inlet of each chamber depending on the target gas pressure thereof.

[0008] In the present invention, preferably, a gas distributor having a plurality of gas outlets is mounted to gas jets of the gas generator; and gas is supplied to each chamber through the gas outlets of the gas distributor. Using the gas distributor as described above facilitates the setting of target values of the distribution amount

and supply pressure of gas to each chamber. Also, using a popular gas generator such as a commercially available product and separately designing only a gas distributor to be mounted thereto can reduce cost.

[0009] In this case, setting the bores of the gas outlets of the gas distributor depending on the inflation characteristics of each chamber facilitates obtaining a target value of the amount and the pressure of gas to be supplied to each chamber.

[Brief Description of the Drawings]

[0010]

Fig. 1 is a perspective view of a vehicle seat having a side airbag apparatus serving as an airbag according to an embodiment.

Fig. 2(a) is a sectional view taken along line II-II of Fig. 1; and Fig. 2(b) is a sectional view taken along line B-B of Fig. 2(a).

Fig. 3 is a perspective view of a gas generator and a gas distributor.

Fig. 4 is a sectional perspective view of the gas generator and the gas distributor.

[Description of the Embodiments]

[0011] The present invention will be described with reference to the drawings below. Fig. 1 is a perspective view of a vehicle seat having a side airbag apparatus serving as an airbag apparatus according to the embodiment; Fig. 2(a) is a sectional view taken along line II-II of Fig. 1; Fig. 2(b) is a sectional view taken along line B-B of Fig. 2(a); Fig. 3 is a perspective view of a gas generator and a gas distributor; and Fig. 4 is a sectional perspective view of the gas generator and the gas distributor.

[0012] As shown in Fig. 1, a side airbag 1 is constructed so as to inflate along a window side portion of a seat 10. The seat 10 includes a seat cushion 11, a seat back 12, and a headrest 13.

[0013] The seat back 12 has a casing (not shown) of the side airbag apparatus mounted on the side thereof, in which the side airbag 1 is folded to be housed in the casing and is covered with a module cover (not shown).

[0014] This side airbag 1 is formed of a sheet-like material such as cloth and a resin sheet in bag shape, wherein the interior is divided into a lower first chamber 1a and an upper second chamber 1b with a partition panel 2 of which the interior is almost horizontal. The first chamber 1a and the second chamber 1b are not substantially communicated with each other.

[0015] In this embodiment, the side airbag 1 includes a gas generator 3 therein. The gas generator 3 is retained by a holder (not shown), wherein the holder is

fixed to the aforesaid casing together with the side airbag 1. In other words, the back face of the side airbag 1 is interposed between the holder and the casing, and the back face of the side airbag 1 is fastened to the casing with bolts or rivets, so that the back face of the side airbag 1 is fixed to the casing together.

[0016] The gas generator 3 mounts a gas distributor 4. In this embodiment, as shown in Figs. 3 and 4, the gas generator 3 has a substantially cylindrical shape, one end of which is provided with gas jets 5. The gas distributor 4 shaped like a substantially hemispherical shell is fastened to the gas generator 3 so as to surround the gas jets 5. The gas distributor 4 is firmly fastened to the gas generator 3 by caulking or welding.

[0017] The gas distributor 4 includes two gas outlets 4a and 4b. The first gas outlet 4a is oriented in substantially the same direction as the direction that the shaft center of the cylindrical gas generator 3 extends toward the one end. The second gas outlet 4b is oriented in the direction substantially perpendicularly crossing and lateral to the shaft center.

[0018] The first gas outlet 4a is larger in diameter than the second gas outlet 4b.

[0019] The first gas outlet 4a is inserted in the first chamber 1a and the second gas outlet 4b is inserted in the second chamber 1b, as shown in Fig. 2.

[0020] In the side airbag apparatus with such an arrangement, in the event of a side collision or an overturning of a vehicle, the gas generator 3 emits gas. The gas is emitted from the gas jets 5 and flows into the first chamber 1a and the second chamber 1b through the gas outlets 4a and 4b of the gas distributor 4, respectively, and inflates the chambers 1a and 1b. Thus, the airbag 1 is deployed along the window side of the seat 10, as shown in Fig. 1. In this case, the first gas outlet 4a is larger in diameter than the second gas outlet 4b; therefore, gas is supplied to the first chamber 1a in larger quantities and at higher pressure than to the second chamber 1b. Consequently, the first chamber 1a is inflated at high internal pressure and receives lateral movement of the waist of an occupant. The second chamber 1b is inflated at lower internal pressure than that of the first chamber 1a, which is preferable for receiving the right upper half of the occupant's body softly.

[0021] In this embodiment, the gas generator 3 is popular, to which the gas distributor 4 is retrofitted; thus, the cost is low. Also, the bores of the gas outlets 4a and 4b of the gas distributor 4 can be designed depending on the target internal pressure of the chambers 1a and 1b.

[0022] In the aforesaid embodiment, since the first chamber 1a is under high pressure, the sheet-like material for surrounding the first chamber 1a may be of high airtightness. Also, the joining section (for example, the seam) of the sheet-like materials for forming the first chamber 1a may be of high airtightness.

[0023] In the aforesaid embodiment, the side airbag 1 is divided into two chambers; however, it may be divided into three or more chambers and the gas distrib-

utor 4 may include three or more gas outlets.

[0024] The gas distributor 4 can be formed of metal, synthetic resin, or ceramic. However, the gas distributor may be made of cloth in this invention.

[0025] In the aforesaid embodiment, the gas generator is shaped like a cylinder; however, gas generators of various shapes, such as a disc, may be used. The present invention can be applied to various types of airbag apparatus other than the side airbag apparatus.

[Advantages]

[0026] As described above, according to the present invention, the pressure when the chambers divided in the airbag are inflated can individually be set.

Claims

1. An airbag apparatus comprising:

an airbag (1) the interior of which is divided into a plurality of chambers (1a; 1b); and
a gas generator (3) for inflating the airbag (1),

characterized in that:

gas is guided directly to each chamber (1a, 1b) from a common gas generator (3).

2. An airbag apparatus according to Claim 1, characterized in that: a gas distributor (4) having a plurality of gas outlets (4a, 4b) is mounted to gas jets (5) of the gas generator (3); and

gas is supplied to each chamber (1a, 1b) through the gas outlets (4a, 4b) of the gas distributor.

3. An airbag apparatus according to Claim 2, characterized in that the bores of the gas outlets (4a, 4b) are set depending on the inflation characteristics of each chamber (1a, 1b).

Fig. 1

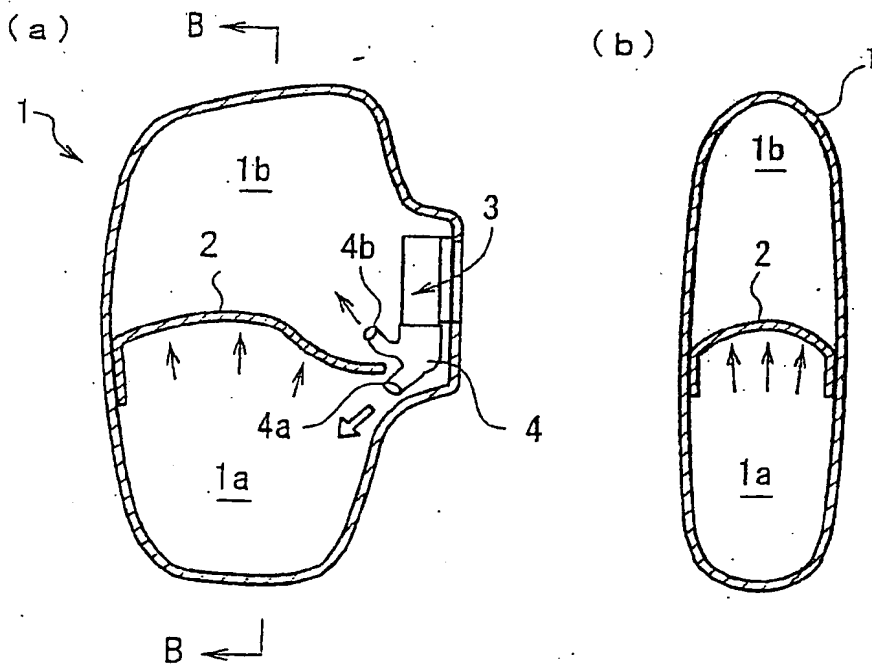
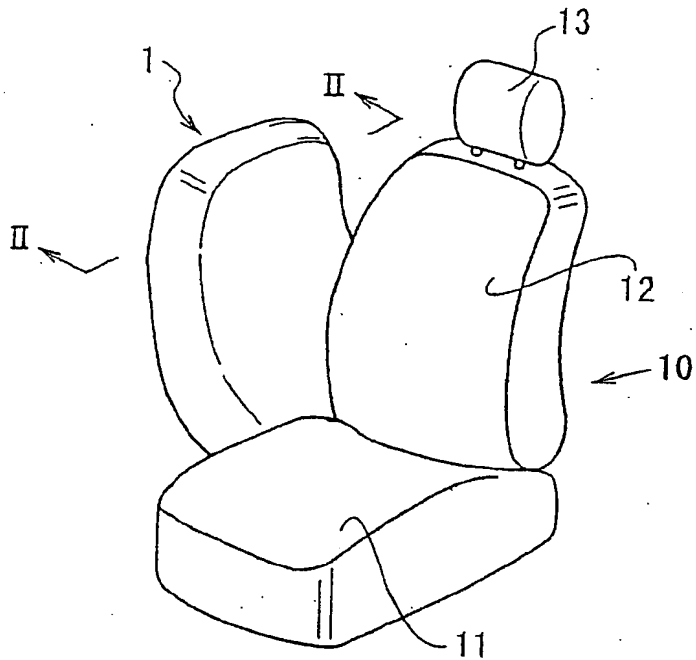


Fig. 2

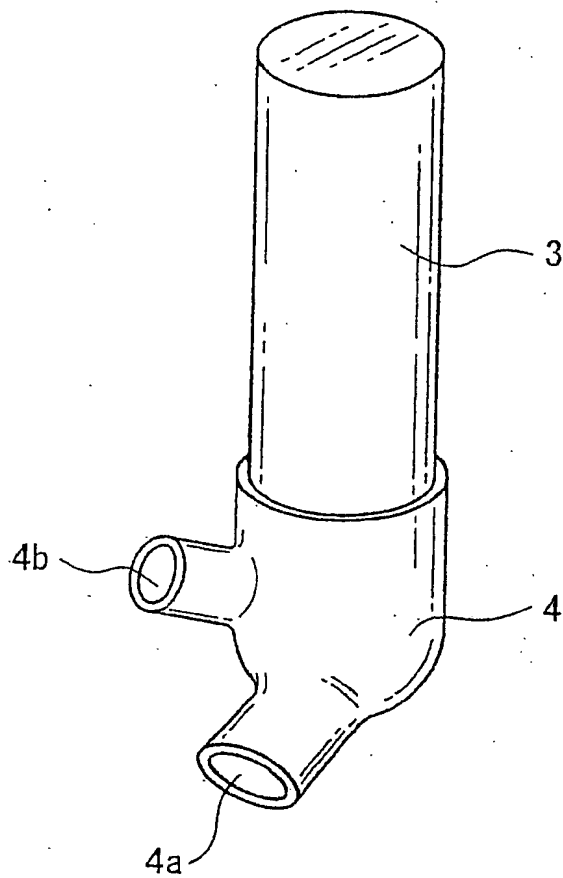


Fig. 3

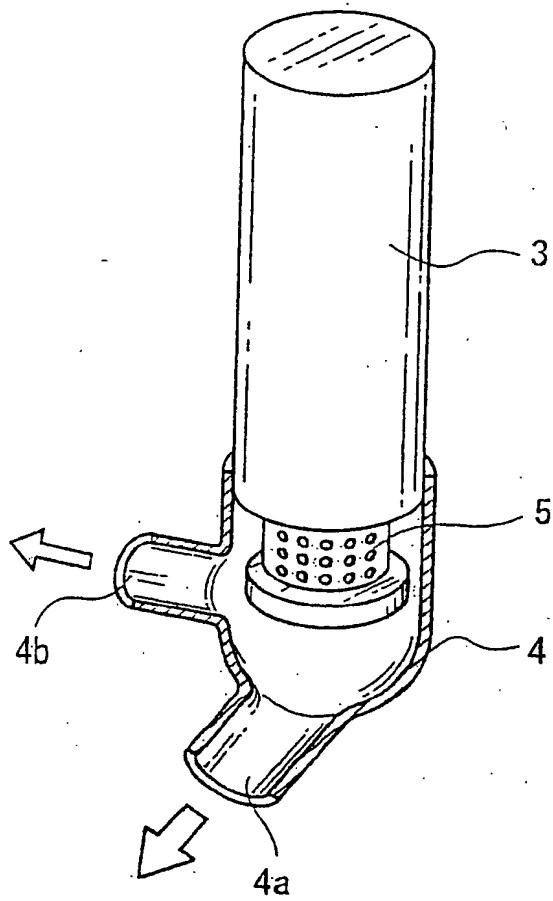
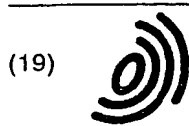


Fig. 4



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 1 340 656 A3

(12)

EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
17.12.2003 Bulletin 2003/51

(51) Int Cl.7: B60R 21/16, B60R 21/26

(43) Date of publication A2:
03.09.2003 Bulletin 2003/36

(21) Application number: 03001367.6

(22) Date of filing: 24.01.2003

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PT SE SI SK TR
Designated Extension States:
AL LT LV MK RO

- Takedomi, Akifumi
Minato-ku, Tokyo 106-8510 (JP)
- Tanaka, Tadashi
Minato-ku, Tokyo 106-8510 (JP)
- Kûrimoto, Takeshi
Minato-ku, Tokyo 106-8510 (JP)

(30) Priority: 25.02.2002 JP 2002048175

(71) Applicant: TAKATA CORPORATION
Minato-ku, Tokyo 106-8510 (JP)

(74) Representative:
Banzer, Hans-Jörg, Dipl.-Ing. et al
Kraus & Welsert
Patent- und Rechtsanwälte
Thomas-Wimmer-Ring 15
80539 München (DE)

(72) Inventors:
• Kumagai, Masayoshi
Minato-ku, Tokyo 106-8510 (JP)

(54) Airbag apparatus

(57) The object is to provide an airbag apparatus capable of individually setting the pressure when the chambers divided in the airbag are inflated. When a gas generator (3) is operated, gas is emitted from gas jets (5) and flows into a first chamber (1a) and a second chamber (1b) through gas outlets (4a) and (4b) of a gas distributor (4), respectively; the chambers (1a) and (1b)

are inflated; and an airbag (1) is deployed along the window side of a seat (10). The first gas outlet (4a) is larger in diameter than the second gas outlet (4b), so that the gas is supplied to the first chamber (1a) in larger quantities and at higher pressure than to the second chamber (1b). Consequently, the first chamber (1a) is inflated at high internal pressure.

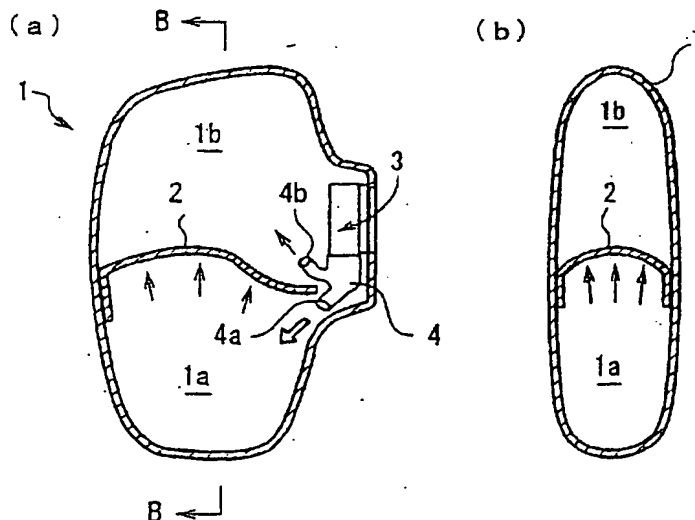


Fig. 2

EP 1 340 656 A3

BEST AVAILABLE COPY



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 00 1367

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	EP 0 999 101 A (TRW REPA GMBH) 10 May 2000 (2000-05-10) * paragraphs [0009],[0016],[0017]; figures 1,10,11A,11B * * abstract *	1-3	B60R21/16 B60R21/26
A	US 5 556 128 A (MUELLER HELMUT-EDGAR DIPL ING ET AL) 17 September 1996 (1996-09-17) * abstract; figure 2 *	1-3	
A	DE 200 16 717 U (TRW REPA GMBH) 15 February 2001 (2001-02-15) * abstract; figures 1,3B *	1-3	
A	DE 299 05 770 U (TRW REPA GMBH) 16 December 1999 (1999-12-16) * abstract; figure 1 *	1-3	
A	US 6 062 143 A (RICHARDS MARVIN K ET AL) 16 May 2000 (2000-05-16) * abstract; figure 5 *	1-3	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B60R
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 22 October 2003	Examiner Wauters, J
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 03 00 1367

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

22-10-2003

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
EP 0999101	A	10-05-2000	DE	19538657 A1	24-04-1997
			CN	1150564 A	28-05-1997
			CZ	9603037 A3	14-05-1997
			DE	59607620 D1	11-10-2001
			EP	0999101 A1	10-05-2000
			EP	0769428 A2	23-04-1997
			ES	2103695 T1	01-10-1997
			JP	3040955 B2	15-05-2000
			JP	9123864 A	13-05-1997
			KR	221911 B1	15-09-1999
			US	5803485 A	08-09-1998
US 5556128	A	17-09-1996	DE	19541513 A1	30-05-1996
DE 20016717	U	15-02-2001	DE	20016717 U1	15-02-2001
			EP	1197400 A1	17-04-2002
			US	2002036396 A1	28-03-2002
DE 29905770	U	16-12-1999	DE	29905770 U1	16-12-1999
			DE	10015160 A1	05-10-2000
			US	6378895 B1	30-04-2002
US 6062143	A	16-05-2000	AU	9774198 A	29-03-1999
			BR	9806165 A	19-10-1999
			EP	0941180 A1	15-09-1999
			JP	2001519746 T	23-10-2001
			WO	9912776 A1	18-03-1999

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82